

Evaluation of Factors and Defects Causing hide and Skin quality Deterioration along its value Chains in Central Highlands of Ethiopia

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Abstract

A study was conducted to evaluate the knowledge and practices of producers, collectors and processors on hide and skin quality management and associated risk factors and common defects on raw and processed hide and skins at export centers. Primary, secondary and visual assessments were used as data collection tools. The current study indicated that 77% of respondents were males and the rest were females. About 42% illiterate respondents were involved in the study. The respondent males (23.4%) and females (30.4%) kept cattle for multiple purposes. The female respondents (69.6%) utilized hide and skin for selling and the male respondents utilized for household consumption and selling. Education level significantly ($P < 0.05$) influenced the utilization of hides and skins. The respondent farmers adopted sun drying method to preserve hide and skin. Few respondents (10.8%) adopted salting and 57.5% did not adopt any preservation practices. About 13.6% and 5.2% of female and male respondents rejected hide and skin due to quality downgrading. The study showed that sex, age and education level did not significantly ($P > 0.05$) influence the rejection rate of hide and skin. The rate of rejection was higher in skin and hide originated from Wolo 46 (47.9%) followed by Gindeberet 38 (39.6%), Addis Ababa 35 (36.5%) and Bonga 26 (27.1%). The odds of rate of rejection in skin and hide originated from Wolo were 2.046 times more likely than in skin and hide originated from Bonga with 95% CI = 0.881-4.752%. Hide and skin originated from Gindeberet were 1.546 times more likely than in skin and hide originated from Bonga areas. The rate of rejection was higher in skin and hide sized from small 35 (87.5%) medium 42 (35.9%), large 50 (32.3%) and extra-large 18 (25.0%). Cockle, flaying cuts, pox lesion, branding, and machine induced were the major defects causing quality downgrading in export centers. This study implied that integrated efforts toward improved livestock husbandry and better health improvements are vital issues for production of better quality hide and skin.

Keywords: Defects; Deterioration; Hide; Skin; Rejection

Introduction

Ethiopia has more than 53 million, along with sheep and goat populations of 25.5 and 24.1 million, respectively and this makes the country first in Africa (CSA, 2013). The agricultural sector in Ethiopia contributes 52% to the gross domestic product (GDP) and

90% to the foreign exchange earnings (CSA, 2008). The country has a potential for production of hide and skins. About 90% to 95% of the hide and skin production is derived from urban as well as rural backyard slaughters and the remaining 5 to 10% from major urban slaughter houses and export abattoirs (Mahmud, 2000).

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Foreign exchange generated from exports of live animals, leather and leather products and meat and meat products amounts to USD 147.9 million, 103.8 million and 63.3 million per year respectively. Even though Ethiopia has good potential to produce substantial quantities of hides and skins, the qualities of hide or skin is being deteriorated and degraded due to several defects and factors (ESGPIP, 2009). These defects are mainly caused by parasites, pre and post slaughter skin management problems. The pre-mortem defects includes scratches, cockle, brand marks, scars, old age defects and poor substances (Kassa, 1998) while post-mortem defects comprise of bruise, brand marks, fly cut, bad bleeding, putrefaction, and beetle damages (Kidanu, 2001).

The leather industry sector is losing large amount of foreign exchanges due to decline in quality and consequently fall in export market (Yacob, 2013). Despite the growing demands of export, producers had limited information and poor knowledge- experience in handling hide and skin at its original state. In addition, there is poor knowledge on the defects at producers, collectors, traders and processors level. A value cascaded analysis was conducted to generate best practices and understanding of potential factors contributing to the deterioration of hide and skin qualities. Therefore, the objectives of this study were: to assess and evaluate the knowledge and practices of producers, collectors and processors on hide and skin handling practices and to identify common defects and factors causing hide and skin quality deterioration and rejection

Materials and Methods

Study Area

The study was conducted in welmera district and tanneries found in central areas of Ethiopia. Welmera district is located 40 km from Addis Ababa towards west direction. The area lies at an altitude of 2060-3380 meter above sea level and receive annual rain fall 1100 mm with the average minimum and maximum temperature at 24 and 27 degree Celsius respectively. The long rainy season extends from June to September followed by a dry season ranging from October to February.

Study population

For the field survey, the study population consisted of all producer farmers that kept livestock in the area. For the defect assessment study, hides and skins that have common defects and lesions were included.

Study Design

A cross-sectional study design was performed to study the knowledge of producers, collectors and processors on hide and skin quality and associated risk factors. Observational study was undertaken in tanneries for identification of common defects on raw and processed hide and skins at export centers.

Sampling technique and Sample size determination

For the field survey study, a systematic random sampling technique was used to select livestock owners through primary data collection methods. Available data were collected from tanneries retrospectively. Therefore, a total of 100 farmers were included in the current study.

Hide and skin observational study

Observational study was conducted to investigate pre-and post-slaughter defects of raw and processed hides and skins at collection and export centers. Hides and skins highly affected by common defects were purposively selected during data collection. So, the methods of curing, salting, smoking and sun drying of hides and skins collection and export centers where raw hides and skins stored were observed for common defect and lesion assessment during the study period.

Data Management and Analysis

Data were collected, coded, entered, managed and stored into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS, version 20) and SAS software. Descriptive statistics were used to analyze data. The Chi-square (χ^2) test and logistic regression were used to observe the association between species and skin defects.

Results and Discussions

Field surveys

Among the 100 respondents, 77% were males and 23% were females. The age of adult and old respondents was 57% and 43% respectively and 42% of them were illiterate at the time of study. About 30.4% and 23.4% of female and male respondents keep cattle and sheep for various purposes. About 39.1% and 48.1% of female and male respondents rear local and cross breed cattle. This might be related with the fact that farmers rear animals mainly for multipurpose, and the female farmers use these animals for milk purposes (Table 1).

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| Types of animals reared by respondents | | | | | |
|--|------------|-----------|----------|-----------|---------|
| Variables | category | Cattle | Sheep | Mixed | P-value |
| Sex | Female | 7(30.4%) | - | 16(69.6%) | 0.70 |
| | Male | 18(23.4%) | 1(1.3%) | 58(75.3%) | |
| Age | Adult | 15(26.3%) | 1(1.8%) | 41(71.9%) | 0.90 |
| | Old | 10(23.3%) | - | 33(76.7%) | |
| Education | Illiterate | 10(23.8%) | - | 32(76.2%) | 0.03 |
| | Elementary | 12(25.0%) | - | 36(75.0%) | |
| | Secondary | 2(28.6%) | - | 5(71.4%) | |
| | Above | 1(33.3%) | 1(33.3%) | 1(33.3%) | |

Table 1: Demographic characteristics of respondents.

Majority of the female respondents (69.6%) utilized hide and skin for income generation through selling. The male respondents utilized hide and skin for household consumption, selling and few of them disposed it. Most of the illiterate respondents used hide and skin for marketing purposes and few of them used it for household consumption. Education level significantly ($P < 0.05$) influenced the

utilization of hides and skins. The large percentage of households practice cattle rearing to potentially produce meat animals and hide and skins (Fekede and Amistu, 2016). The result was also in line with the findings of (Alemnesh, 2015) who reported that the use of hide and skin (73.5%) for income generation in Adami Tulu areas.

| Skin and hide usage | | | | | | | |
|---------------------|------------|-----------------|---------------|----------------|-----------|-------------|----------|
| | Variable | Non-slaughtered | For marketing | House hold use | Sold some | Thrown away | P- value |
| Sex | Female | 3(13.0%) | 16(69.6%) | - | - | 4(17.4%) | 0.22 |
| | Male | 3(3.9%) | 53(68.8%) | 8(10.4%) | 2(2.6%) | 11(14.3%) | |
| Age | Adult | 3(5.3%) | 38(66.7%) | 6(10.5%) | 1(1.8%) | 9(15.8%) | 0.90 |
| | Old | 3(7.0%) | 31(72.1%) | 2(4.7%) | 1(2.3%) | 6(14.0%) | |
| Education | Illiterate | 4(9.5%) | 25(59.5%) | 2(4.8%) | 1(2.4%) | 10(23.8%) | 0.00 |
| | Elementary | 2(4.2%) | 38(79.2%) | 3(6.2%) | - | 5(10.4%) | |
| | Secondary | - | 4(57.1%) | 3(42.9%) | - | - | |
| | Above | - | 2(66.7%) | - | 1(33.3%) | - | |

Table 2: Purposes of skin and hide used by Producer respondents.

Majority of the respondent farmers adopted sun drying method in preserving hide and skin. Few respondents (10.8%) adopted salting and 57.5% did not adopt any preservation practices. This finding was similar to the works of (Getachew et al, 2017) who reported 6.25% of the farmers used salt preservation methods for hide and skin preservation and 94.01% used ground air drying methods. Some authors such as Fekede and Amistu, 2016 also indicated that 25% and 24% of butcheries used salting and smoking methods for hide and skin preservation. Almost all respondents use traditional ways of preservation methods. This could be associated with the fact that majority of the respondents were not aware of the modern preservation techniques.

Most of the female respondents did not reject (63.6%) and 13.6% rejected hide and skin due to quality deterioration. Male respondents (66.2%) did not reject and 5.2% rejected hide and skin. About 62.5% of adult respondents did not reject where as 7.1% rejected hide and skin. Majority of illiterate respondents did not reject hide and skin. Sex, age and education level did not significantly ($P > 0.05$) influence the rejection rate of hide and skin. This might be associated with the fact that rejection of hide and skin is resulted from poor qualities. There are several defects and lesions that are responsible for deteriorating of hide and skin products and degrade their quality. These conditions might be one of the reasons for rejection of hides and skin in the study areas (Table 2).

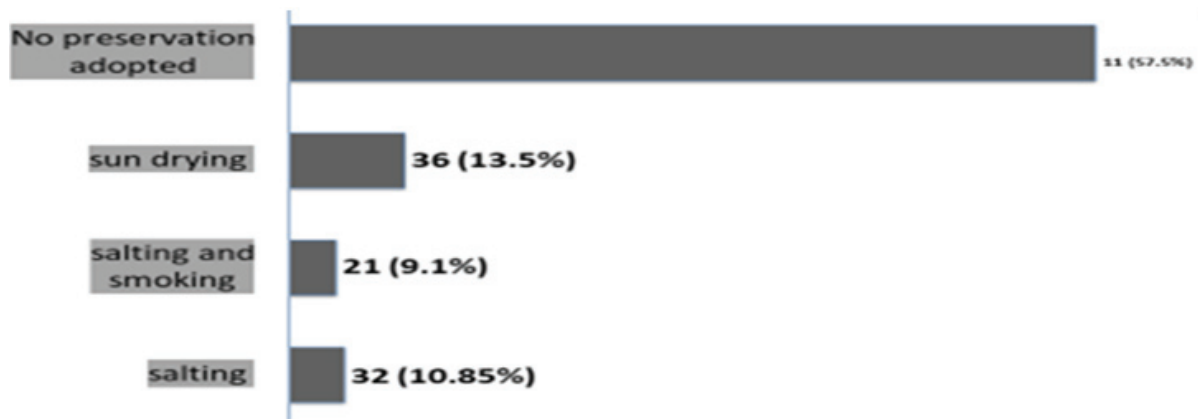


Figure 1: Hide and skin preservation methods adopted by producers and collectors.

| Respondent determinants on rejection condition | | | | | |
|--|------------|-----------------------|--------------------|-----------|---------|
| Variables | Categories | No rejection rate (%) | Rejection rate (%) | Non-sell | p-value |
| Sex | Female | 14(63.6%) | 3(13.6%) | 5(22.7%) | 0.42 |
| | Male | 51(66.2%) | 4(5.2%) | 22(28.6%) | |
| Age | Adult | 35(62.5%) | 4(7.1%) | 17(30.4%) | 0.80 |
| | Old | 30(69.8%) | 3(7.0%) | 10(23.3%) | |
| Education level | Illiterate | 25(61.0%) | 2(4.9%) | 14(34.1%) | 0.30 |
| | Elementary | 34(70.8%) | 4(8.3%) | 10(20.8%) | |
| | Secondary | 4(57.1%) | - | 3(42.9%) | |
| | Above | 2(66.7%) | 1(33.3%) | - | |

Table 3: Respondent determinants on Hide and skin rejection.

Observational Study on Hide and Skin rejection by collectors in collection centers

The rate of rejection was higher in skin and hide originated from Wolo 46 (47.9%) followed by Gindeberet 38(39.6%), Addis Ababa 35 (36.5%) and Bonga 26 (27.1%). The odds of rate of rejection in skin and hide originated from Wolo were 2.046 times more likely than in skin and hide originated from Bonga with 95% CI = 0.881-4.752%. Hide and skin originated from Gindeberet were 1.546 times more likely than in skin and hide originated from Bonga with 95% CI = 0.760-3.145%. The rate of rejection was higher in skin and hide from sheep 72 (43.1%) followed by goats 50 (41%) and cattle 23 (24.2%). The odds of rate of rejection in skin and hide originated from sheep were 2.218 times more likely than in skin and hide from cattle (95% CI = 1.044-4.712%). The odds of the rate of skin and hide rejection in skin and hide preserved from salted were 0.613 times more likely than in skin and hide preserved from dried (95% CI = 0.244-1.539%). The rate of rejection was higher in skin

and hide sized from small 35 (87.5%) medium 42 (35.9%), large 50 (32.3%) and extra-large 18(25.0%). The odds of rate of rejection in skin and hide sized from small were 22.43 times more likely than in skin and hide sized from extra-large with 95% CI = 7.512-66.993%. The rate of rejection in large sized hide and skin were 1.5 times more likely than in skin and hide sized from extra-large with 95% CI = 0.778-2.948%.

A considerable proportion of hide and skin rejection cases in the collection and export center directly or indirectly related to skin diseases caused by ectoparasites or to the secondary damage that occurs when the animal scratches itself to relief the itching, and poor curing methods. This is could also be by manual removal of hide and skins if not carefully done, can cause extensive damage to the products via cuts and holes which substantially reduce their qualities and values (Table 4).

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| Risk factors | | No. of skin and hide examined | | P value | Odds | |
|--|---------------|-------------------------------|--------------------|---------|--------|------------|
| | | N | Rejection rate (%) | | OR | 95% CI |
| Origin | Bonga | 96 | 26 (27.1) | - | 1 | - |
| | Addis Ababa | 96 | 35 (36.5) | 1.00 | 1.00 | 0.450-2.22 |
| | Wolo | 96 | 46 (47.9) | 0.096 | 2.046 | 0.881-4.75 |
| | Gende beret | 96 | 38(39.6) | 0.229 | 1.546 | 0.760-3.14 |
| Species | Cattle† | 95 | 23 (24.2) | - | 1 | - |
| | Sheep | 167 | 72 (43.1) | 0.038 | 2.218 | 1.044-4.71 |
| | Goat | 122 | 50(41) | 0.137 | 1.808 | 0.828-3.94 |
| Preservation | Dried† | 348 | 129(37.1) | - | 1 | - |
| | Salted | 36 | 16(44.4) | 0.298 | 0.613 | 0.244-1.53 |
| Size | Extra-large † | 72 | 18(25.0) | - | 1 | - |
| | Small | 40 | 35(87.5) | 0.000 | 22.434 | 7.512-66.9 |
| | Medium | 117 | 42(35.9) | 0.214 | 1.525 | 0.784-2.96 |
| | Large | 115 | 50(32.3) | 0.222 | 1.515 | 0.778-2.94 |
| N, number examined; †, Reference category; OR, odds ratio; CI, confidence interval | | | | | | |

Table 4: Logistic regression analysis for skin and hide rejection by collectors in tanneries.

Assessment of common hide and skin defects at export center

The present study showed that one or multiple defects were observed in all examined hides and skins in export tanneries. On visual examination of hide and skins at export centers, cockle(12.9%), Flaying cuts (22.6%) and pox lesion (9.7) were the predominant defects in East Africa export center whereas branding (2,6%), machine defect (36.8%), Pox lesion (10.5 %), and flaying cuts (21.1%) were the major defects causing quality downgrading in Farida export center. Branding and pox lesion (9.7%), and cockle (9.7%) were also the common defects frequently causing downgrading of hide and skin quality in hora export center. Mwinyihijal (2006) reported that management problems could predispose hide and skin to damages such as scratches, drag marks, and pricking which could affect the leather surface of the corium layer which after tanning lowers the quality of leather. These conditions might be one of the reasons for the occurrence of scars, bruising and other defects observed on hide and skin. The findings from the current study also indicated that Cockle, pox lesions, bruising, flaying cuts and branding were the most common defects causing downgrading of hide and skin. This was in agreement with the works of Melkamu (2014) who reported that flay cuts (12.2%), gouge mark (17.7%), poor pattern (13.5%), and scar (6.7%) in East Gojjam. Assessment of factors causing skin defects at Bahir Dar Tannery revealed cockled caused by ectoparasitism as a major cause of skin quality degradation (Bisrat, 2013).

Conclusion and Recommendations

In conclusion, assessing knowledge and practices of communities and identify major hide and skin defects showed knowledge and information gaps, problem in hide and skin management practices, and the occurrence of major defects that can contribute to downgrading of hide and skins. Cockle and pox lesions are the major defects causing downgrading of hide and skins qualities. Therefore, it is recommended to integrate hide and skin quality management in livestock extension packages, Appropriate prophylactic packages and related management practices in considering awareness creation should be adopted and strengthened for those communities that their livelihood rely on rearing animals, Management parameters should be strengthened in the hide and skin tanneries to promote its export products and Future studies should take into account the economic impacts of hide and skin quality deterioration factors or defects to formulate better options to be adopted in the study area.

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| Common defects | | Types of Tanneries | | |
|--|-----|--------------------|------------|-----------|
| | | East Africa (%) | Farida (%) | Hora (%) |
| branding remarks | 3 | 0.0 | 2(6.5) | 1(3.2) |
| Branding remarks & pox lesions | 3 | 0.0 | 0.0 | 3 (9.7) |
| Branding remarks, pox lesions & flaying cuts | 1 | 0.0 | 0.0 | 1(3.2) |
| Coclé/ekek | 4 | 4 (12.9) | 0.0 | 3(9.7) |
| Crack | 2 | 0.0 | 2(6.5) | 0.0 |
| Flaying cuts | 28 | 7 (22.6) | 8(21.1) | 13(41.9) |
| Machine induced | 14 | 0.0 | 14 (36.8) | 0.0 |
| Parasite damage | 1 | 0.0 | 0.0 | 1(1.0) |
| Poor pattern & hole | 8 | 3(9.7) | 0.0 | 5(7.9) |
| Pox lesions | 8 | 3 (9.7) | 4(10.5) | 1(3.2) |
| Pox lesions and flaying cuts | 4 | 0.0 | 2(3.2) | 2(1.0) |
| Putrefactions | 7 | 3(9.7) | 4(10.5) | 0.0 |
| Scar | 7 | 3(10.5) | 4(10.5) | 0.0 |
| Scratching | 10 | 4(12.9) | 4(10.5) | 2(6.5) |
| Overall | 100 | 31(30.7) | 37 (37.6) | 32 (32.5) |

Table 5: Defects commonly observed by processors at export centers.

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